IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.:	10/802,428	Confirmation No.:	3515
Applicant:	Bin Zhang		
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Examiner:	David N. Werner		
Title:	ESTIMATING MOTION TRIALS IN VIDEO IMAGE SEQUENCES		
Docket No.:	200314385-1 (HPC.0783US)		

Mail Stop Appeal Brief-Patents
Commissioner for Patents
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REPLY BRIEF

Sir:

The following sets forth Appellant's Reply to the Examiner's Answer dated June 9, 2011.

A. REPLY TO EXAMINER'S ANSWER REGARDING THE § 103 REJECTION OF CLAIMS 1-3, 7, 10-12, 25 OVER DE SMET AND ZHANG

The Appeal Brief set forth detailed reasons regarding the differences between the claimed subject matter and the teachings of de Smet and Zhang, and why the present invention is non-obvious over de Smet and Zhang.

The Response to Arguments section of the Examiner's Answer continues to argue that the Zhang reference constitutes a § 102(b) bar against the present invention. It is clear that, by the Examiner's own admission, the present invention is different from the teachings of Zhang. Therefore, the publication of Zhang does not constitute a statutory bar and loss of patent rights with respect to the invention claimed in the present application. Moreover, in arguing that Zhang discloses the claimed subject matter, the Examiner appears to focus on just three words: "K-

Harmonic Means function." Examiner's Answer at 9-10. The Examiner's argument is that since Zhang discloses a K-Harmonic Means algorithm, and since claim 1 uses the phrase "K-Harmonic Means function," that the claimed invention is disclosed by Zhang.

This allegation is clearly incorrect. Claim 1 recites more than just a "K-Harmonic Means function." Claim 1 specifically defines elements of the "regression clustering" recited in claim 1. In fact, lines 9-26 of claim 1 are all directed to defining what such regression clustering includes.

As explained in the Appeal Brief, it is clear that the hypothetical combination of de Smet and Zhang provides no hint of the claimed subject matter, including the regression clustering defined by lines 9-26 of claim 1. The Examiner argued that Appellant "has not disclaimed that the K-Harmonic Means algorithm [of Zhang] is somehow uniquely not suited as an improvement over the K-Harmonic Means algorithm for the specific claim application of image data segmentation." Examiner's Answer at 11. It is unclear why such a disclaimer is needed, since, as explained in detail in the Appeal Brief, the teachings of Zhang are different from the claimed subject matter.

It is apparent that the obviousness rejection is based on incorrect characterizations of the invention made by the Examiner, and therefore, the rejection is clearly erroneous.

Additionally, the Response to Arguments section of the Examiner's Answer did not address Appellant's arguments set forth in the Appeal Brief regarding why Zhang fails to disclose or hint at values representing errors between the data points and corresponding ones of the K regression functions. As recited in claim 1, values representing errors between the data points and corresponding ones of the K regression functions are calculated. Note that the K regression functions estimate motion paths in the image sequence. In the "using" clause of claim

1, the motion paths represented by the calculated K regression functions are used if the changes in membership probabilities or changes in the K regression functions satisfy a stopping criterion.

Zhang describes computing Euclidean distances between data points and cluster center positions m_k (equated by the Examiner with the regression functions, *see* Examiner's Answer at 5). From equation 5 on page 5 of Zhang, it is clear that m_k represents a **geometric center position** for a respective cluster k. On the other hand, the K regression functions of claim 1 **estimate motion paths** in an image sequence, and claim 1 recites calculating values representing errors between the data points and corresponding ones of the K regression functions that **estimate motion paths**. Examples of such values representing errors are provided on page 15, ¶ [0068], of the present application. As further noted in ¶ [0065] of the present application, an example error function as expressed in ¶ [0065] and in equation 9 is used. It is clear that, contrary to the Examiner's allegations, Zhang does not provide any teaching or hint of calculating errors between the data points and corresponding ones of the K regression functions, where the K regression functions estimate motion paths in the image sequence.

It is also clear that de Smet fails to provide any teaching or hint of the foregoing claimed subject matter.

Further, as pointed out by the Appeal Brief, the Examiner has made several fundamentally incorrect assertions. First, the Examiner erred in arguing that "a difference or distance between motion vectors" of de Smet is the claimed "error" in claim 1. 10/27/2010 Office Action at 6. The motion vectors of de Smet are part of a motion field between two consecutive image frames of a sequence. De Smet, § 2.1. A motion vector is calculated for each segment. *Id.*, Abstract. As explained in § 2.2 of de Smet, over-segmentation of an image is a problem. De Smet discloses a technique in which segments of the image can be merged based

on similarity of respective motion vectors for the segments. *Id.*, § 2.3. Thus, according to de Smet, a difference or distance between motion vectors refers to a difference or distance between motion vectors for corresponding multiple segments of an image.

A distance between motion vectors, as disclosed by de Smet, clearly does not constitute errors between **data points** and corresponding ones of **K regression functions**, where the regression functions estimate motion paths in the image sequence. In claim 1, the errors are between data points and regression functions, whereas in de Smet, the calculated difference is a distance between motion vectors.

Thus, it is clear that, contrary to the Examiner's allegation, de Smet provides no teaching of the foregoing claimed subject matter.

In response to the foregoing arguments, the Examiner argued that the Examiner was pointing to the calculation in Zhang regarding the distance between a data point and a corresponding center point. Examiner's Answer at 14. However, as discussed above, it is clear that the center point (m_k) of Zhang represents a **geometric** center position for a respective cluster k. On the other hand, the K regression functions of claim 1 **estimate motion paths** in this sequence, and claim 1 recites calculating values representing errors between the data points and corresponding ones of the K regression functions that estimate motion paths. The geometric distance between data points and center points in Zhang clearly do not constitute errors between data points and corresponding K regression functions as specifically defined by claim 1.

Another incorrect assertion by the Examiner is the statement that the center points of Zhang "are believed to be the endpoints of the motion vectors in the [motion] field" of de Smet. 10/27/2010 Office Action at 4; Examiner's Answer at 14. This assertion is also incorrect.

The center positions, m_k, as expressed in equation 5 of Zhang, represent centers of clusters. K centers define corresponding K clusters. Zhang, § 1, ¶ 2. It is clear that the center positions represented by equation 5 of Zhang are geometric center positions of the respective clusters of data points. The center positions of equation 5 of Zhang cannot be the endpoints of motion vectors of de Smet, as alleged by the Examiner. Based on a thorough review of Zhang, it is clear that the clustering performed in Zhang has nothing to do with providing motion information regarding data points. Since each center position as calculated according to the equation 5 of Zhang represents a geometric center, it is clear that such center position cannot be the endpoint of a motion vector. In fact, arguing that the center point of Zhang is the endpoint of a motion vector makes no sense in the context of Zhang. The center position of a cluster represents the actual geometric center of the cluster of data points—each motion vector in de Smet represents motion between respective segments of images in de Smet. The endpoint of such motion vector has nothing to do with the center point of a cluster of data points. Since the Examiner erred in arguing that the center points of Zhang "are believed to be the endpoints of the motion vectors" of de Smet, the obviousness rejection is further defective based on this additional error.

In view of the foregoing and in view of the arguments presented in the Appeal Brief, it is clear that the obviousness rejection of the foregoing claims is erroneous.

B. REPLY TO EXAMINER'S ANSWER REGARDING THE § 103 REJECTION OF CLAIM 5

Dependent claim 5 further recites **randomly** initializing **regression functions** for each of the K clusters. Although page 11 of Zhang refers to random initialization for the algorithms, there is no teaching or hint in this page of Zhang or anywhere else in Zhang of randomly initializing **regression functions** for each of the K clusters.

In view of the foregoing and in view of the arguments presented in the Appeal Brief, it is clear that claim 5 is clearly allowable over de Smet and Zhang.

C. CONCLUSION

In view of the foregoing, and in view of the arguments presented in the Appeal Brief, reversal of all final rejections is respectfully requested.

Respectfully submitted,

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